CASE STUDY

Project Zurich

Zurich Transport Authority ZVV

Zurich Transport Authority (ZVV)

Zurich with its population of 400,000 people is the capital of the eponymous canton and the largest city in Switzerland. For decades, the city and canton of Zurich have focussed on providing public transport in the world's most modern multi-agency control system on behalf of the 1.3 million people in the agglomeration.

The canton of Zurich and its surroundings covering around 1,839 km^2 form the multi-agency area of Zurich Transport Authority (ZVV) with more than 30 transport service providers. The ZVV consists of eight companies with market responsibility and numerous small and medium-sized transport contractors. Around 700 million passengers are carried every year by well over 1,000 vehicles. Every day, more than half a million passengers cross Zurich's city border on public transport.

ZVV is responsible for the strategic management, multi-agency wide marketing and funding of public transport. It also ensures that there is "one ticket for all" (tariff and multi-agency) in the living and economic area of Zurich.

Different regions, different frequencies

ZVV's transport network operates a regular service on all routes. The commuter train routes passing through Zurich central station usually run every half hour. In more sparsely populated areas, trains and buses run an hourly service, while bus routes near to the cities run every fifteen minutes during the day. In the cities of Zurich and Winterthur, trams, trolleybuses and omnibuses run at far shorter intervals during the day.

"The ZVV control system connects the transport agencies within the Zurich Transport Authority. The customer therefore benefits not only from "one ticket for all", but also from transfer information that crosses the boundaries of the individual transport operators."

Mario Schmid, Head of the Control Centre for Verkehrsbetriebe Zurich

One Multi-Agency Control System for Six Transport Operators

The city and canton of Zurich attach great importance to public transport and have the world's most modern multi-agency system. The ZVV control system links up a total of six transport operators operating altogether more than 1,000 vehicles.

The complex system was planned, supplied and commissioned in four phases between 2004 and 2012. Among others, multifunctional displays in buses and trams also show transfer connections to SBB (Swiss Federal Railways). Comprehensive, up-to-date information helps to make the journey time seem shorter for the passengers so that they can be more flexible in reacting to any delays or incidents.

The ZVV Control System at a Glance

Automatic Vehicle Location & Control System (AVLC)

- Trapeze control system (AVLC) LIO
- Geographic Information System (GIS)
- Transfer protection to third-party systems
- Business Intelligence solution LIO-BI

Control Centre

- 4 control centres, 14 dispatcher workstations, 70 info stations
- 9 data supply workstations with data management solution LIO-Data
- Form system and Workflow Management

Radio System

- Hybrid radio: analogue radio and PLMN, 19 voice channels, 24 data channels, 16 base stations
- Voice radio via Voice-over-IP, 133 transmitters/receivers for data/voice radio

Vehicles

- 37 depots for buses and trams
- More than 1,000 vehicles (buses, trams and cable cars) with Trapeze on-board computers IBISplus G1 or IDR-f2 and touchscreen user terminals
- Vehicles loaded with software and data using Wi-Fi
- Traffic light preemption
- GPS-based location

Dynamic Passenger Information

- 300 stop DPI signs SmartInfo G4 (4-line and 8-line display) or SmartInfo G4i Large
- More than 1,600 Multifunctional Displays (MFD) in vehicles
- Traveller Data Interface TDI for information via web, smartphone etc.

Software Interfaces

- Interfaces to the radio system, to the planning program and for integrating DPI signs at individual stops

Central Control of Important Functions

The ZVV is served by buses and trams from six different operators with 1,100 vehicles running altogether. Each of these operators has its own LIO workstations, and four have their own control centre for controlling their vehicles. The individual operators all also use their own voice and data channels.

But the multi-agency system is based on a shared data supply and a central control centre infrastructure at Verkehrsbetriebe Zurich (VBZ). The concept also envisages standardisation in the vehicles and with the equipment at the stops. The passengers thus benefit from uniform info systems, real-time information, transfer protection and naturally from central incident management.

Lead-House Functions of VBZ

As the largest operator in ZVV, VBZ assumes so-called lead-house functions. For example, at night the VBZ control centre takes over emergency calls for smaller operators. VBZ is also responsible for central tasks involved in data transfer and data distribution within the multi-agency.

Furthermore, VBZ runs a technical centre for radio, vehicle equipment and stop equipment. It also chairs the Control Centre Commission with participation from all ZVV transport companies where joint forward-looking budget and strategy decisions are taken.

High Service Quality – Thanks to the Trapeze Control System

Thanks to the Trapeze AVLC, the ZVV transport companies are able to register and optimise their operational states and service quality. If incidents occur, the control system draws the attention of the dispatchers to possible problems at an early point in time. If necessary, they can then intervene in operations and initiate appropriate action. On a parallel basis, the control system helps them to provide their passengers swiftly with up-to-date information.

All operational data are recorded for subsequent analysis. The Business Intelligence solution LIO-BI is used to produce numerous statistics and evaluations. These important aids give the ZVV numerous possibilities for constant quality control and for optimising performance.

"We are very satisfied with Trapeze's AVLC. It fulfils all our expectations. Efficient operational management with data and voice communication as well as targeted incident management help us every day. The customers benefit from prompt, consistent information."

Mario Schmid, Head of the Control Centre for Verkehrsbetriebe Zurich

Well Equipped: the ZVV Vehicles

Altogether there are 37 depots in the ZVV where buses and trams are refuelled, cleaned and maintained. While vehicles are in the depot, new software and current data are transferred by Wi-Fi to their on-board computers.

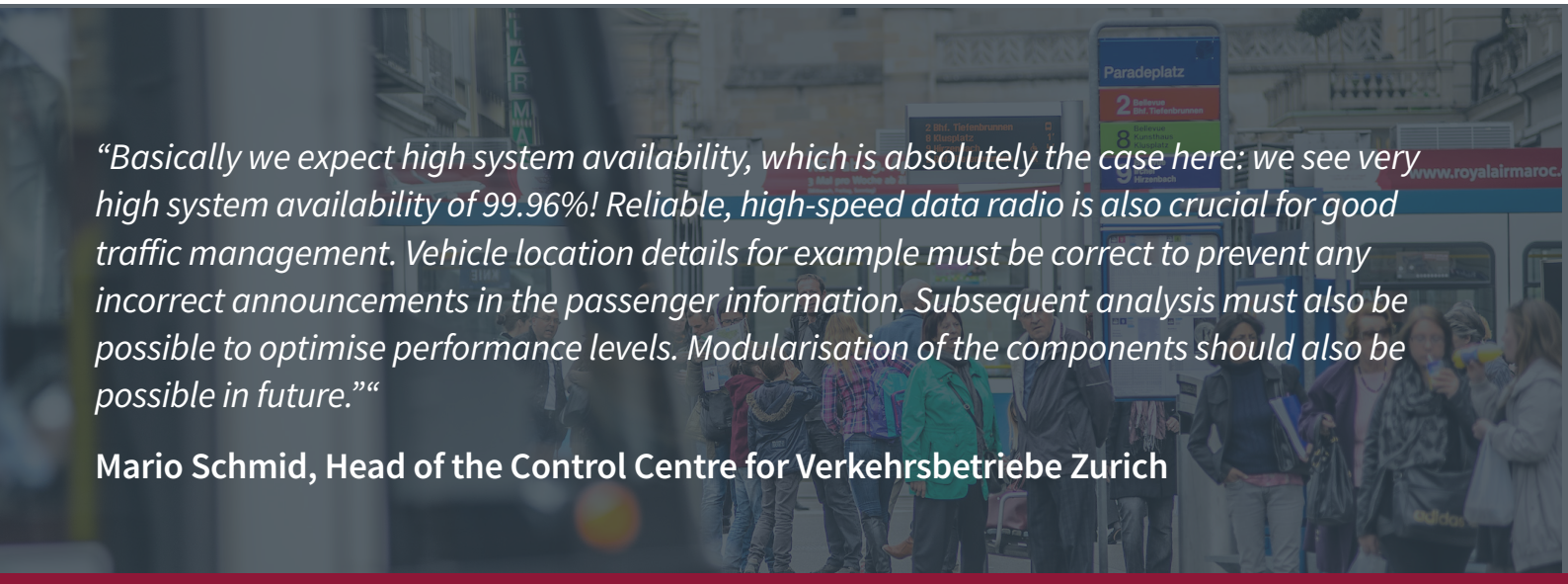
Two different models of Trapeze on-board computers are installed in the ZVV vehicles: IBISplus G1 or the newer model IDR-f2. Drivers operate the on-board computer with a modern user terminal with touchscreen (MTT or IPT), which they also use to communicate with the control centre or with other vehicles.

Furthermore, buses and trams are given priority at traffic lights to accelerate public transport. This is implemented by a local traffic light request; the vehicle or rather the on-board computer communicates via an analogue radio device with a junction controller at the respective traffic light system.

The control centre needs to know the exact locations of all vehicles at all times, with GPS location of the vehicles via the on-board computer. These location details also provide the basis for the departure times in the passenger information. The location system must therefore work properly so that no incorrect information is shown.

Everything Under Control: Effective Incident Management

Incidents in the operational workflows often necessitate rapid changes or corrections in the control system. This puts the control centre staff under great time pressure, as ideally the passengers notice the incidents as little as possible.



“Basically we expect high system availability, which is absolutely the case here: we see very high system availability of 99.96%! Reliable, high-speed data radio is also crucial for good traffic management. Vehicle location details for example must be correct to prevent any incorrect announcements in the passenger information. Subsequent analysis must also be possible to optimise performance levels. Modularisation of the components should also be possible in future.”“

Mario Schmid, Head of the Control Centre for Verkehrsbetriebe Zurich

The targeted incident management system gives the dispatchers valuable support, particularly in situations where every second counts. Besides actions or operational information, the system can also be used to send messages to all passenger information signs in the whole network.

Furthermore, the system offers the dispatchers pre-defined actions which can be prepared during quieter periods. Dispatchers then revert to such actions when things get hectic and implement the defined workflow plan.

Always Up-To-Date: Real-Time Passenger Information

Today's passengers expect constantly updated information about the status of their specific journey, so that the passenger information is therefore integrated as a central function in the LIO system. The ZVV uses Multifunctional Displays (MFD) in the vehicles and LED signs at the stops (SmartInfo G4 and SmartInfo G4i Large). They show the departure times in real-time, together with current information for the passengers when the need arises.

Every vehicle has at least one MFD to show the jumping dot display of the stops together with current messages. The displays in the vehicles also show transfers and journey continuation options. Transfer protection is an important part of the ZVV control system. In the event of an incident, e.g. route closure, all displays and DPI signs are automatically updated by the AVLC.

> *"The proven, close cooperation with Trapeze's development engineers is crucial for solving problems quickly. We also expect a long service life, continuity and decreasing maintenance costs. In future we want to profit from innovations and further developments made by Trapeze. We are also willing to continue contributing our know-how in future too and to be involved in the further development process."*
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> **Mario Schmid, Head of the Control Centre for Verkehrsbetriebe Zurich**

Working Together as Partners: Open for Innovation

Verkehrsbetriebe Zurich have been a Trapeze customer for more than 50 years, with the two companies working together as partners on a good basis for decades. Trapeze supplied the world's first AVLC control system to VBZ in 1968. VBZ has always had an interest in providing its passengers with the best, most advanced technical solutions.

VBZ is a courageous pioneer and is not afraid to act as pilot customer to be the first company that implements new solutions offering a high customer benefit. Any "teething problems" that emerge with a newly developed product are tested first in a "proof of concept". What matters to VBZ is to benefit as soon as possible from innovations and further developments made by Trapeze.

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